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(54) Title: PERIODIC ACID COMPOSITIONS FOR POLISHING RUTHENIUM/HIGH K SUBSTRATES

(57) Abstract: A method of polishing a semiconductor substrate surface having at least one ruthenium feature thereon and at least one dielectric material, wherein the substrate is contacted with an aqueous composition containing from about 0.0005 to about 1 moles / kilogram of periodic acid, from about 0.2% to about 6% % by weight of silica abrasive having an average particle size of about 50 nm or less, and an amine in an amount sufficient to adjust the pH of the composition to between about 2.5 and 7. The removal selectivity of the ruthenium to a low-K dielectric is greater than 20:1. Advantageously, the substrate further has a tantalum-containing compound, and the polishing rate of the tantalum-containing compound is about the same as the polishing rate of the ruthenium, so that the polishing process is a one-step process.



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